TRAVAUX DU MUSÉUM NATIONAL D'HISTOIRE NATURELLE «GRIGORE ANTIPA»

THE JOURNAL OF "GRIGORE ANTIPA" NATIONAL MUSEUM OF NATURAL HISTORY

Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa" 66 (1): 197–209 (2023)
doi: 10.3897/travaux.66.e108195

RESEARCH ARTICLE

Preliminary observations on the food availability and diet composition of the Romanian hamster *Mesocricetus newtoni* (Rodentia, Cricetidae)

Viorel Dumitru Gavril[1, 2], Oana Cristiana Vasiliu[3, 4], Ioana Cobzaru[1], Dumitru Murariu[1], Tiberiu Constantin Sahlean[1], Gabriel Bogdan Chișamera[1], Roxana Georgiana Nicoară[1]

1 *Institute of Biology Bucharest, Romanian Academy, 296 Splaiul Independenței, Bucharest, Romania*
2 *University of Bucharest, Faculty of Biology, Splaiul Independenței 91–95, Bucharest, R-050095, Romania*
3 *Wildlife Rescue and Rehabilitation Center, "Visul Luanei" Foundation, Cheiul Dâmboviței, Popești Leordeni, Ilfov 077160, Romania*
4 *University of Agronomic Sciences and Veterinary Medicine of Bucharest, 105 Splaiul Independenței, Bucharest, Romania*

Corresponding author: *Oana Cristiana Vasiliu* (oana.c.vasiliu@gmail.com)

Received 18 June 2023 | Accepted 21 June 2023 | Published 30 June 2023

Citation: Gavril VD, Vasiliu OC, Cobzaru I, Murariu D, Sahlean TC, Chișamera GB, Nicoară RG (2023) Preliminary observations on the food availability and diet composition of the Romanian hamster *Mesocricetus newtoni* (Rodentia, Cricetidae). Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa" 66(1): 197–209. https://doi.org/10.3897/travaux.66.e108195

Abstract

The Romanian hamster *Mesocricetus newtoni* is endemic to South-Eastern Romania (Dobruja region) and North-Eastern Bulgaria, and prefers steppic, arid, uncultivated habitats, but is also found in alfalfa fields, less often in corn cultures and field-protecting vegetation belts. Previous studies provide only limited data regarding the diet of this cryptic species. The diet of one family group (one female and four pups) was monitored for 10 days, during the vernal season. The data was collected using camera traps and direct observations, supplemented by photos. Plants were identified at the species level. A vegetation survey was performed in a radius of 25 m^2 around the burrows using the pratological method, estimating a percentage of each plant species present in the habitat. A number of 16 plants were identified as part of the diet of the Romanian hamster, mostly herbaceous species within the Brassicaceae family. According to the observations, *Erodium cicutarium* (Geraniaceae) and *Papaver rhoeas* (Papaveraceae) were consumed most frequently, followed by *Descurainia sophia* (Brassicaceae), *Sisymbrium orientale* (Brassicaceae), *Medicago minima* (Fabaceae) and *Buglossoides arvense* (Boraginaceae). In the studied area,

Copyright *Gavril, Vasiliu, Cobzaru, Murariu, Sahlean, Chișamera & Nicoară*. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

PENSOFT

38 plant taxa were determined and characterized as ruderal and segetal (weeds of arable land) plants, mostly native to Eurasia. The purpose of this study is to provide novel data on the diet composition of the Romanian hamster in accordance with plant taxa availability and to emphasize the importance of conservation measures of its preferred habitats, which are crucial to the survival of the species.

Keywords
Mesocricetus newtoni, diet, vegetation, field margins, conservation, foraging.

Introduction

Considerable spatial and temporal variation in the feeding habits of rodents is known to exist, especially in relation to plant phenology and availability, with significant changes over the seeding season (Soininen et al. 2013; Sunyer et al. 2014). Food availability is considered crucial to defining the relationship between species and their habitat niches (Wilson et al. 2017).

The Cricetinae subfamily, commonly referred to as hamsters, includes 18 mammalian taxa, and is established as a monophyletic clade, with ecomorphological traits differentiating them from other rodents. Common characteristics of hamsters include the usage of underground burrows, solitary behaviour, and the storage of food using "cheek pouches"; they feed mainly on fruits, seeds, but also vegetative parts of plants, and sometimes on small animals (Larimer et al. 2011; Miljutin 2011; Wilson et al. 2017).

The Romanian hamster *Mesocricetus newtoni* (Nehring, 1989) is endemic to South-Eastern Romania (Dobruja region) and North-Eastern Bulgaria, inhabiting lowlands along the right bank of the Danube River (Niethammer 1982; Vohralik 1999). The primary biotope of *M. newtoni* is characterised by steppic, uncultivated xerophilous landscapes. Sometimes individuals can be found in cultivated lands, especially in alfalfa fields, and less often in corn cultures and field-protecting vegetation belts; the species is almost always absent in arable lands (Marcheș 1964; Murariu and Popescu 2001; Peshev et al. 2004).

Up to 22 plant species have been identified as part of its diet, which is considered to be mainly herbivorous, comprising various cereals, herbs, fruits and roots, but sometimes the Romanian hamster consumes invertebrates and even small animals, such as mice and small birds (Dombrowski 1907; Hamar and Șutova 1963). In captivity, the animals favoured seeds of round shapes, such as cockle or corn, and avoided wheat, while oat was abandoned altogether (Marcheș 1964).

Regarding the storage behaviour, Marcheș (1964) reported that food deposits, of up to 800 grams, are only made by males, while females prioritise nursing their pups, storing only small quantities of food, if any. The same study states that these rodents gather almost exclusively the seeds from both wild and cultivated plants. Although one hamster can carry up to 20 grams of food in its cheek pouches, laboratory studies report a daily consumption of only about 10–15 grams of food (Marcheș 1964). For

semi-fossorial rodents, the best strategy for predator avoidance is to minimise the time spent out of the burrow (Larimer et al. 2011). Therefore, food storage behaviour provides the animals with more freedom from foraging, especially during difficult environmental conditions (Lea and Tarpyt 1986; Larimer et al. 2011).

Historically, Romanian hamsters were considered pests and most studies focused on methods of controlling their population numbers (Vasiliu 1937; Ausländer and Hellwing 1957; Hamar and Șutova 1963). The significant intensification of agriculture during the last decades lead to a loss of suitable habitats and most likely has a negative impact on this species, now classified as "near threatened" according to the IUCN (Coroiu and Vohralík 2008). *M. newtoni* is protected under the Bern Convention (1993) and under the Habitats Directive 92/43/EEC, Annexes II and IV. Regardless of the protection status, neither an official action plan nor information on the population density are available for Romania. The aim of the current study is to provide novel data on the diet composition of the Romanian hamster in relation to the food availability in its habitat. Knowledge on the diet composition of this threatened species can contribute to the implementation of adapted conservation measures.

Materials and methods

Animals and study area

One family group, comprised of one adult female and four pups, were observed near Săcele village, Constanța county, Romania. The family group was monitored over a period of 10 days, in two intervals: 06 May – 11 May and 15 May – 18 May, in 2017. Monitoring of the animals was made using a Reconyx PC850 Professional camera trap (programmed to capture sequences of 5 photos) and multiple Ltl Acorn 6210 camera traps (programmed to capture 3 photos and a 20 second video). Also, direct observations of the animals were made during daytime between 07:00 and 10:00 AM and 16:00 and 20:00 PM, in accordance with peak activity intervals observed in other *Mesocricetus* species (Gattermann et al. 2008; Larimer et al. 2011), and were supplemented by photos taken with Canon 5D mark III, using a Canon 100-400 mm, F4.5-5.6 L telephoto lens.

Vegetation survey

Vegetation surveys were performed during the vernal season in the natural environment of the species, around the burrows entrance. All plant species in a radius of 25 m^2 around the burrows were inventoried (Fig. 1). The vegetation cover was assessed using the pratological method, which implies an estimated percentage for each plant species (Ivan and Doniță 1975). The works of Ciocârlan (2009) and Sârbu et al. (2013) were used for taxa identification and their ecological characteristics. The nomenclature is in accordance with Flora Europaea through *www.europlusmed.org*, a database containing updated information on all plant taxa present in the European and Mediterranean regions.

Figure 1. Habitat of the monitored *M. newtoni*, characterized by steppe pasture with ruderal vegetation, adjacent to wheat crop fields.

Results

Observations on the plant taxa consumed

A total of 16 plant taxa were identified as part of the diet of the Romanian hamster, mostly herbaceous species within the Brassicaceae family, with five species identified. There were followed by Fabaceae, Papaveraceae and Caryophyllaceae, each with two species, and Ranunculaceae, Geraniaceae, Violaceae, Boraginaceae and Scrophulariaceae, with only one species (Fig. 2). *Erodium cicutarium* (Geraniaceae) (Fig. 4) and *Papaver rhoeas* (Papaveraceae) (Fig. 5) were consumed most frequently, followed by *Descurainia sophia* (Brassicaceae) (Fig. 6), *Sisymbrium orientale* (Brassicaceae), *Medicago minima* (Fabaceae) (Fig. 7) and *Buglossoides arvense* (Boraginaceae). The list of plant species identified in the diet of *Mesocricetus newtoni* is presented in Table 1.

Vegetation survey

The habitat in the study area was characterized by semi-natural vegetation distributed close to agricultural land (along the field's margins). During our observations, a number of 38 plant taxa were identified in the study area (Table 2). These phytocenoses were characterized by the presence of ruderal and segetal plants (weeds of arable land), mostly native to Eurasia, along with several Mediterranean, Pontic or cosmopolite taxa. The main components of the grassy layer are the annual, biannual, or winter annual species, and only a small percentage is represented by the perennials (*Anchusa azurea, Poa bulbosa, Convolvulus arvensis, Linaria vulgaris*). The low trophicity and the sandy texture of the soil is highlighted by the presence of *Cerastium brachypetalum, Draba verna* and *Vicia lathyroides*. The plant family with the highest degree of coverage was Brassicaceae (39%), followed by Papaveraceae (11%) and Geraniaceae (10%) (Fig. 3).

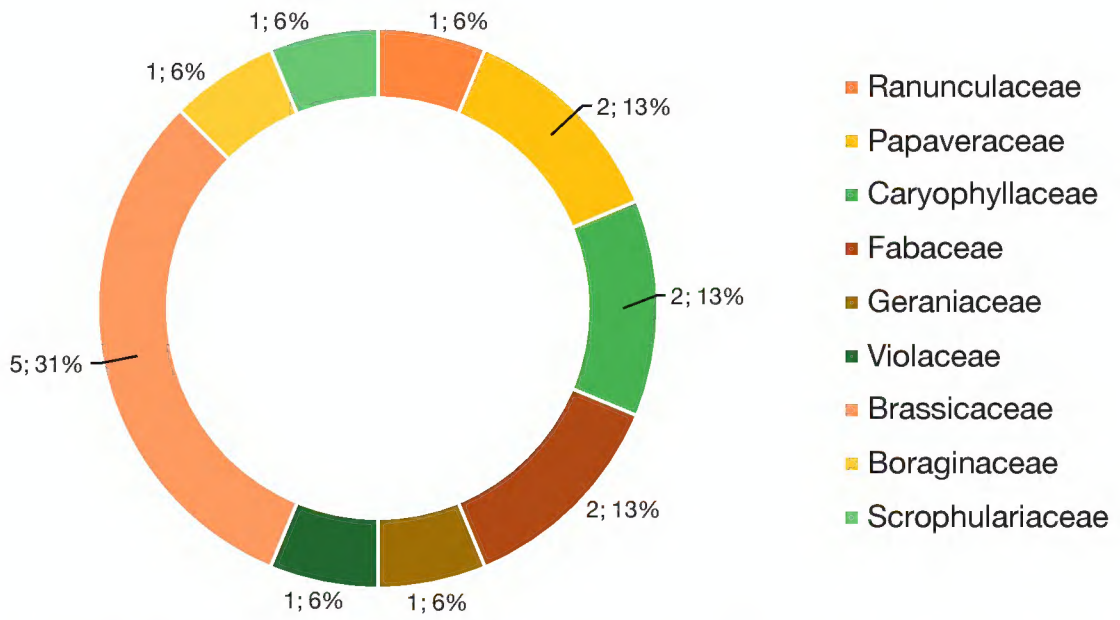

Figure 2. Plant families reported in the diet of *M. newtoni*. The number of taxa and percentage (%) from each family is represented.

Structurally, two vegetation layers can be distinguished in the plant community: **(1)** the upper layer consisting of tall species (50–80 cm), which are represented in % of covered area: *Descurainia sophia* (10%), *Sysimbrium orientale* (10%), *Papaver rhoeas* (10%), *Camelina mycrocarpa* (2%), *Melilotus officinalis* (less than 1%), and **(2)** the lower floor consisting of smaller species that include *Erodium cicutarium* (10%), *Medicago minima* (3%), *Draba verna* (less than 1%), *Ajuga chamaepytis* (1%), *Veronica arvensis* (less than 1%), and *Allysum hirsutum* (1%).

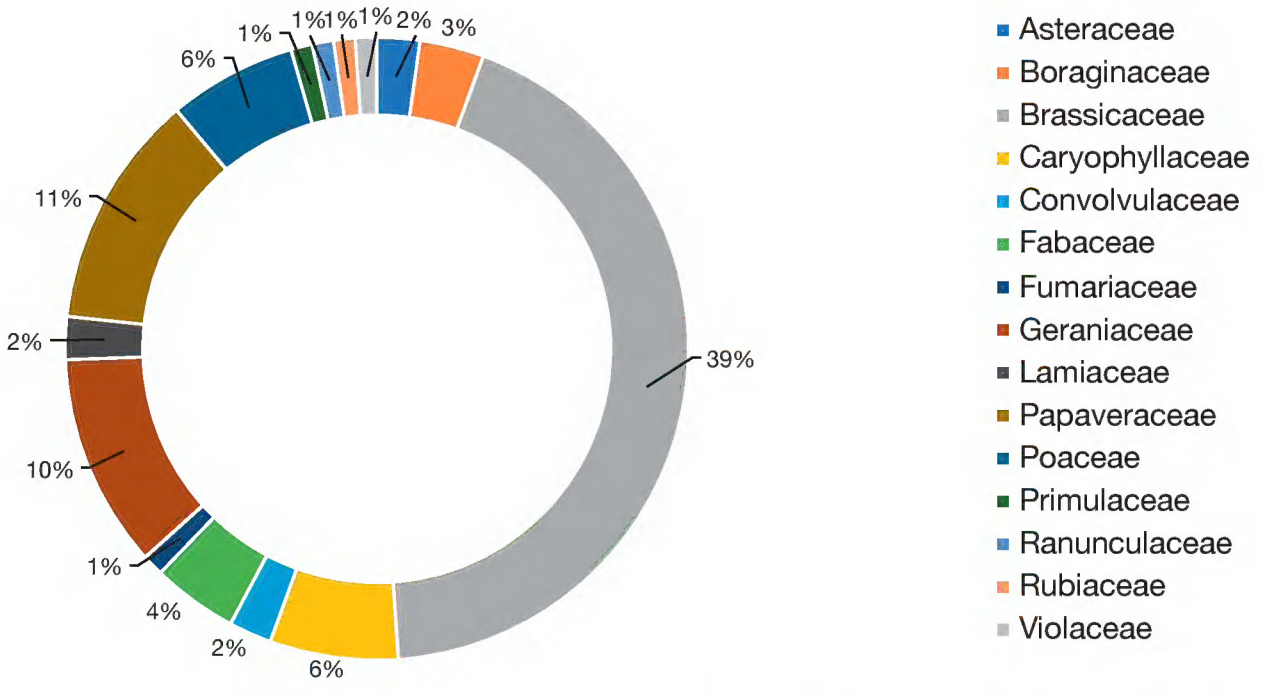

Figure 3. Representative plant families reported during the vegetation survey in the habitat of *M. newtoni*. The number of taxa and percentage (%) from each family is represented.

Figure 4. Romanian hamster feeding on *Erodium cicutarium* (Geraniaceae).

Figure 5. Romanian hamster feeding on *Papaver rhoeas* (Papaveraceae).

Figure 6. Romanian hamster feeding on *Descurainia sophia* (Brassicaceae).

Figure 7. Romanian hamster feeding on *Medicago minima* (Fabaceae).

Table 1. Plant taxa consumed by *M. newtoni* as cited by existing literature (Marcheș 1964), during harvest season (June–July) and identified during this study, during peak season (May)

Type of food and taxa		As reported by Marches, 1964	Identified during our study
Ranunculaceae	*Ranunculus arvensis* L.	seeds	-
	Adonis flammea Jacq.	-	green parts
Papaveraceae	*Papaver rhoeas* L.	seeds	green parts
	Papaver dubium L.	-	green parts
Caryophyllaceae	*Agrostemma githago* L.	seeds	-
	Arenaria serpyllifolia L.	-	green parts
	Cerastium brachypetalum Pers.	-	green parts
Polygonaceae	*Polygonum aviculare* L.	seeds	-
Fabaceae	*Lupinus albus* L.	seeds	-
	Medicago sp.	green parts	-
	Medicago minima (L.) L.	-	green parts
	Pisum sativum subsp. elatius (M. Bieb.) Asch. & Graebn.	seeds	-
	Pisum sativum subsp. *sativum* L.	seeds	-
	Trifolium sp.	green parts	-
	Vicia hirsuta (L.) Gray	seeds	-
	Vicia lathyroides L.	seeds	green parts
	Vicia sativa L.	seeds	-
	Vicia pannonica subsp. striata (M. Bieb.) Nyman	seeds	-
Euphorbiaceae	*Euphorbia cyparisias* L.	seeds	-
Geraniaceae	*Erodium cicutarium* (L.) L'Hér	-	green parts
Violaceae	*Viola arvensis* Murray	-	green parts
Brassicaceae	*Brassica rapa subsp. campestris* (L.) A.R. Clapham	-	green parts
	Camelina microcarpa Andrz. ex DC.	-	green parts
	Sisymbrium orientale L.	-	green parts
	Thlaspi arvense L.	-	green parts
	Descurainia sophia (L.) Webb ex Prantl	-	green parts
Convolvulaceae	*Convolvulus arvensis* L.	seeds	-
Cuscutaceae	*Cuscuta epithymum* (L.) L.	seeds	-
Boraginaceae	*Buglossoides arvense* (L.) I. M. Johnst.	-	green parts
Scrophulariaceae	*Veronica arvensis* L.	-	green parts
Rubiaceae	*Galium tricornutum* Dandy	seeds	-
Asteraceae	*Sonchus sp.*	seeds	-
Poaceae	*Avena fatua* L.	seeds	-
	Phleum pratense L.	seeds	-
	Sorghum bicolor (L.) Moench	seeds	-
	Setaria pumila (Poir.) Roem. & Schult.	seeds	-

Table 2. Plant taxa identified during the vegetation survey, in a 25 m^2 area around the burrow of *M. newtoni*, in a habitat characterised by by steppe pasture with ruderal vegetation, adjacent to wheat crop fields; "+" defines the presence of the plant taxa

Species	Family	Vegetation cover	*M. newtoni* diet
Cyanus segetum Hill.	Asteraceae	+	
Draba verna L.	Brassicaceae	+	
Fallopia convolvulus (L.) Á. Löve	Polygonaceae	+	
Linaria vulgaris Mill.	Scrophulariaceae	+	
Melilotus officinalis (L.) Lam.	Fabaceae	+	
Plantago lanceolata L.	Plantaginaceae	+	
Sanguisorba minor Scop.	Rosaceae	+	
Thlaspi arvense L.	Brassicaceae	+	+
Valerianella coronata (L.) DC.	Valerianaceae	+	
Veronica arvensis L.	Scrophulariaceae	+	+
Adonis flammea Jacq.	Ranunculaceae	1%	+
Ajuga chamaepytes (L.) Schreb.	Lamiaceae	1%	
Alyssum hirsutum M. Bieb.	Brassicaceae	1%	
Anchusa azurea Mill.	Boraginaceae	1%	
Androsace maxima L.	Primulaceae	1%	
Capsella bursa-pastoris (L.) Medik.	Brassicaceae	1%	
Fumaria sp.	Fumariaceae	1%	
Galium sp.	Rubiaceae	1%	
Lamium amplexicaule L.	Lamiaceae	1%	
Lepidium campestre (L.) W. T. Aiton	Brassicaceae	1%	
Papaver dubium	Papaveraceae	1%	+
Vicia lathyroides L.	Fabaceae	1%	+
Viola arvensis Murray	Violaceae	1%	+
Buglossoides arvense (L.) I. M. Johnst.	Boraginaceae	2%	+
Camelina microcarpa Andrz. ex DC.	Brassicaceae	2%	+
Convolvulus arvensis L.	Convolvulaceae	2%	
Lepidium draba L.	Brassicaceae	2%	
Tripleurospermum inodorum (L.) Sch. Bip.	Asteraceae	2%	
Anisantha sterilis (L.) Nevski	Poaceae	3%	
Arenaria serpyllifolia L.	Caryophyllaceae	3%	+
Cerastium brachypetalum Pers.	Caryophyllaceae	3%	+
Medicago minima (L.) L.	Fabaceae	3%	+
Poa bulbosa L.	Poaceae	3%	
Brassica rapa subsp. *campestris* (L.) A. R. Clapham	Brassicaceae	10%	+
Sisymbrium orientale L.	Brassicaceae	10%	+
Erodium cicutarium (L.) L'Hér	Geraniaceae	10%	+
Papaver rhoeas L.	Papaveraceae	10%	+
Descurainia sophia (L.) Webb ex Prantl	Brassicaceae	12%	+
Total vegetation cover		**90%**	

Discussions

During this study, 16 plant taxa were identified as part of the diet of the Romanian hamster; of them, only two (*Vicia lathyrois* and *Medicago* sp.) have been previously noted (Marcheș 1964). The same study mentions various plant taxa as part of the diet in *M. newtoni*, but most were consumed as seeds, while in our study the hamsters were seen feeding on the green parts of the plants, probably due to the different seasonal availability, as Marches (1964) conducted the study during harvest season (June–July). Similarly, Hamar and Șutova (1963) report a predilection towards the green parts of plants during the spring.

Following direct observations, *Erodium cicutarium* (Geraniaceae) (Fig. 4) and *Papaver rhoeas* (Papaveraceae) (Fig. 5) were consumed most frequently, followed by *Descurainia sophia* (Brassicaceae) (Fig. 6), *Sisymbrium orientale* (Brassicaceae), *Medicago minima* (Fabaceae) and *Buglossoides arvense* (Boraginaceae). Plant taxa from the Euphorbiaceae and Papaveraceae families, usually avoided by domestic grazing animals (as they contain latex and other toxic compounds), were previously known to be part of the diet of *M. newtoni* (*Euphorbia cyparisias, Papaver rhoeas L.*) and have also been identified during this study (*Papaver dubium L., Papaver rhoeas L.*) (Marcheș 1964; Murariu and Popescu 2001).

The vegetation survey was crucial to understanding the feeding ecology of *M. newtoni*, as most semi-fossorial rodents are known to forage close to the burrows, in order to preserve resources and avoid predators. The identified plant taxa were xerophyte-mesoxerophyte species, which could indicate that *M. newtoni* has a specialized diet; this might suggest that the Romanian hamster could be vulnerable to changes in the plant composition of its habitat and less adaptable to different ecological conditions, particularly in the context of agricultural industrialization. More observations are necessary to categorise food items based on preference and season and usage of collected plants as nesting materials and not as food should be considered (Tissier et al. 2019). However, non-plant species consumed by *M. newtoni* remain unknown. It has been reported that animal-protein, consisting of arthropods, molluscs and other small animals supplement the generally herbivorous diet of the species and that pups are highly dependent on macronutrient diet composition, particularly protein content (Dombrowski 1907). During this study, *M. newtoni* has only been observed consuming plants, although the monitoring methods used could have been biased due to the short time of direct observations and the limited field of view of the camera traps. Experimentally, in other hamster species, a low protein diet impaired reproductive success, which could have implications for the wild populations, considering the decline in arthropod fauna in agricultural lands, affected by habitat change and pesticide use (Wilson et al. 1999; Weitten et al. 2018)

In the agricultural landscape, *M. newtoni* has been reported in buffer strips (Ausländer and Hellwing 1957; Popescu and Barbu 1964), as per this study. In Europe, wheat, rapeseed, and maize have replaced alfalfa, clover, bean and potato cultures and rarely present buffer strips with wild plants (Tissier et al. 2019). This negatively

affects hamsters due to synchronized harvesting (associated with increased predatory exposure and insufficient resources for storage), loss of plant and invertebrate variety and the destruction of burrows (La Haye et al. 2014; Surov et al. 2016). Buffer strips are preferred habitats in other rodent species over mowed areas and the importance of maintaining them as a food and cover resource has been demonstrated for small mammals (Wilson et al. 2005; Yletyinen and Norrdahl 2008).

To the best of our knowledge, no studies exist on the current adaptations of the species to modern agriculture. Large parts of Romania are dominated by a low semi-natural vegetation abundance in agricultural land, coupled with limiting environmental conditions: diversity and accessibility of food items, increased exposure to predators and extreme weather (Wilson et al. 2005; García-Feced et al. 2015). In accordance, we recommend adhering to the European Common Agricultural Policy (2023–2027), which includes recommendations for environmental care, the preservation of landscapes and preventing biodiversity loss. One of the recommended measures under the Good Agricultural and Environmental Conditions (GAEC) is GAEC 8, which requires that at least 4% of the arable area of farms larger than 10 hectares of arable land to be preserved as an "ecological focus area" associated non-productive areas and features, including land lying fallow.

Conclusions

The current paper provides new data regarding the diet of *M. newtoni*, underlining a high diversity of plant taxa consumed during the vernal period, in accordance with the available plants present in its habitat. During this study, a number of 16 plant species have been observed to be part of its diet; of them, 14 are recorded for the first time. This preliminary data precedes future research on the feeding ecology, food availability and adaptations to habitat changes of Romanian hamsters and highlights a potential vulnerability to a lack of variety imposed by crop monocultures. The maintenance and development of buffer strips with wild vegetation, adjacent to agricultural fields, are suggested as management practices for the conservation of the Romanian hamster.

Acknowledgments

This study was partially funded by project no. RO1567-IBB04/2023 from the Institute of Biology Bucharest of Romanian Academy.

References

Ausländer D, Hellwing S (1957) Observations écologiques sur les petits Mammifères des écrans forestiers de protection de "Valul Traian": Références spéciales concernant leur

dynamique. Travaux du Muséum d'Histoire Naturelle "Grigore Antipa" 1: 111–139. [in French]

Ciocârlan V (2009) Flora ilustrată a României. Pteridophyta et Spermatophyta. Ceres, 1141 pp. [in Romanian]

Coroiu I, Vohralík V (2008) *Mesocricetus newtoni*. The IUCN Red List of Threatened Species. Accessed on 02.05.2023. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T13221A3421872.en.

Dombrowski RR von (1907) *Mesocricetus newtoni*, Nehring: Monographische studie. Buletinul Societății de Științe din București-România/Bulletin de la Société des Sciences de Bucarest-Roumanie 16: 94–101. [in German]

García-Feced C, Jakob Weissteiner C, Baraldi A, Luisa Paracchini M, Maes J, Zulian G, Kempen M, Elbersen B, Pérez-Soba M (2015) Semi-natural vegetation in agricultural land: European map and links to ecosystem service supply. Agronomy for Sustainable Development 35: 273–283. https://doi.org/10.1007/s13593-014-0238-1

Gattermann R, Johnston RE, Yigit N, Fritzsche P, Larimer S, Özkurt S, Neumann K, Song Z, Colak E, Johnston J, McPhee ME (2008) Golden hamsters are nocturnal in captivity but diurnal in nature. Biology Letters 4: 253–255. https://doi.org/10.1098/rsbl.2008.0066

Hamar M, Șutova M (1963) Studiul ecologic al rozătoarelor (Glires) din Bărăgan și Dobrogea. Analele Secției de Protecția Plantelor, Institutul Central de Protecția Plantelor I: 195–216. [in Romanian]

La Haye MJJ, Swinnen KRR, Kuiters AT, Leirs H, Siepel H (2014) Modelling population dynamics of the Common hamster (*Cricetus cricetus*): Timing of harvest as a critical aspect in the conservation of a highly endangered rodent. Biological Conservation 180: 53–61. https://doi.org/10.1016/j.biocon.2014.09.035

Ivan D, Doniță N (1975) Metode practice pentru studiul ecologic și geografic al vegetației. Facultatea de Biologie, Universitatea din București, București, 250 pp. [in Romanian]

Larimer SC, Fritzsche P, Song Z, Johnston J, Neumann K, Gattermann R, McPhee ME, Johnston RE (2011) Foraging behavior of golden hamsters (*Mesocricetus auratus*) in the wild. Journal of Ethology 29: 275–283. https://doi.org/10.1007/s10164-010-0255-8

Lea SEG, Tarpyt RM (1986) Hamsters' demand for food to eat and hoard as a function of deprivation and cost. Anim. Behav 34, 1759–1768.

Marcheș G (1964) Contribuţii la studiul taxonomic, biologic, ecologic şi de creştere în captivitate a grivanului sau hamsterului dobrogean (*Mesocricetus newtoni* Nehring), un nou animal de experienţă. Studii şi Cercetări de Igienă şi Sănătate Publică. București: 185–215. [in Romanian]

Miljutin A (2011) Trends of specialisation in rodents: the hamsters, subfamily Cricetinae (Cricetidae, Rodentia, Mammalia) Acta Zoologica Lituanica 21: 192–206. https://doi.org/10.2478/v10043-011-0024-0

Murariu D, Popescu A (2001) Fauna României Vol. 16: Mammalia, Fasc. 2: Rodentia. Editura Academiei Române, București, 208 pp. [in Romanian]

Niethammer J (1982) Mesocricetus newtoni (Nehring, 1898) - Rumanischer Goldhamster In: Niethammer J, Krapp F (Eds) Handbuch der Säugetiere Europas, Band 2/I, Rodentia II. Akademische Verlagsgesellschaft, 29–38. [in German]

Peshev T, Peshev D, Popov V (2004) Fauna Bulgarica, 27, Mammalia. Editio Academica "Marin Drinov", 632 pp. [in Bulgarian]

Popescu A, Barbu P (1964) Contribuţii la studiul sistematicii şi dinamicii mamiferelor mici din împrejurimea Măcinului. Studii şi Cercetări de Biologie. Seria Zoologie 16(4): 351–361.

Sârbu I, Ştefan N, Oprea A (2013) Plante vasculare din România: determinator ilustrat de teren. Victor B Victor, 1320 pp. [in Romanian]

Soininen EM, Ravolainen VT, Bråthen KA, Yoccoz NG, Gielly L, Ims RA (2013) Arctic Small Rodents Have Diverse Diets and Flexible Food Selection. PLoS ONE 8. https://doi.org/10.1371/journal.pone.0068128

Sunyer P, Espelta JM, Bonal R, Muñoz A (2014) Seeding phenology influences wood mouse seed choices: The overlooked role of timing in the foraging decisions by seed-dispersing rodents. Behavioral Ecology and Sociobiology 68: 1205–1213. https://doi.org/10.1007/s00265-014-1731-x

Surov A, Banaszek A, Bogomolov P, Feoktistova N, Monecke S (2016) Dramatic global decrease in the range and reproduction rate of the European hamster *Cricetus cricetus*. Endangered Species Research 31: 119–145. https://doi.org/10.3354/esr00749

Tissier ML, Marchandeau S, Habold C, Handrich Y, Eidenschenck J, Kourkgy C (2019) Weeds as a predominant food source: a review of the diet of common hamsters *Cricetus cricetus* in farmlands and urban habitats. Mammal Review 49: 152–170. https://doi.org/10.1111/mam.12149

Vasiliu G (1937) Rozătoarele din România și combaterea lor. Ministerul Agriculturii și Domeniilor, București, 103 pp. [in Romanian]

Vohralik V (1999) *Mesocricetus newtoni*. In: Mitchell-Jones AJ, Giovanni A, Wiesław B, Krystufek B, Reijnders PJH, Spitzenberger F, Stubbe M, Thissen JBM, Vohralik V, Zima JE (Eds), The atlas of European mammals. Academic Press, London.

Weitten M, Tissier ML, Robin JP, Habold C (2018) Dietary proteins improve hibernation and subsequent reproduction in the European hamster, *Cricetus cricetus*. American Journal of Physiology-Regulatory, Integrative and Comparative Physiology 315(4): 848–855.

Wilson D, Lacher T, Mittermeier R (2017) Handbook of the mammals of the world: vol. 7 : Rodents II. Lynx Edicions. Barcelona, 1008 pp.

Wilson JD, Whittingham MJ, Bradbury RB (2005) The management of crop structure: a general approach to reversing the impacts of agricultural intensification on birds? Ibis 147: 453–463.

Wilson JD, Morris AJ, Arroyo BE, Clark SC, Bradbury RB (1999) A review of the abundance and diversity of invertebrate and plant foods of granivorous birds in northern Europe in relation to agricultural change. Ecosystems and Environment 75: 13–30.

Yletyinen S, Norrdahl K (2008) Habitat use of field voles (*Microtus agrestis*) in wide and narrow buffer zones. Agriculture, Ecosystems and Environment 123: 194–200. https://doi.org/10.1016/j.agee.2007.06.002

*** www.europlusmed.org